The Interface

"Taking Commodore Computing Into The Twenty First Century And Beyond ..."

May - June 2007

The Editor's Godzilla

-by Lenard R. Roach

June is the busy month for yours truly as I begin to "get down and get funky" with all that I wish to say and do at CommVEx. Sadly, my jobs (that's plural) are getting busier as the summer months are here with people taking vacations and on summer break from school. Time is getting rare for me to do anything on the Commodore.

One of my busy tasks is to totally discharge the GABE.U.PAK.64 so it can be at full capacity when it is recharged and ready for the demonstration. Gabriel has already done this with his battery packs he has invented. I do hope to demo his creations along with the GABE.U.PAK.64. It is a good practice to totally discharge a recharge NiCD and NiMH battery packs like the GABE.U.PAK.64 in order to help prevent a memory effect to build up on them. Memory effect is the ultimate enemy to rechargeable batteries. It robs the user of capacity that would otherwise be used for power longevity.

I am also busy checking on maps, routes and reservations to make sure everything is in order. This is the first time I have planned such a big trip so I want to make sure everything is okay. I wish for no surprises during this entire journey both to and from Las Vegas.

With that all said, let's get into this issue of The Interface ...

It is great to read that the C4 Commodore Expo went over so well. I don't know how may from FCUG got a chance to go, but from what I read in the report filed in this issue, it seems that it was a great time that was had by all attending and those who missed out are the losers here. It seemed that everything went their way with items like the doors opening early for set up and being able to stay late for chit chat. That is something that in Christian circles is called "afterglowing." Then it was dinner time. Something in Christian circles that is called "fellowship." I call it "scarfing" or "pigging out."

A note was sent to me from Lord Ronin of ACUG that they are not getting the newsletter. I would like to bring that to the attention of whomever is reproducing and mailing out The Interface to please make sure that ACUG is getting a copy on a regular basis. Thank you.

I just finished inputting Ray Carlson's article on his new invention that even with my five plus years of working with electricity I should be able to understand, but I am in transportation and I don't do much in the way of actualy shop work like Ray does on a regular basis. It sounds interesting and it would be great if someone could coax him into coming to CommVEx and demonstrating this protector.

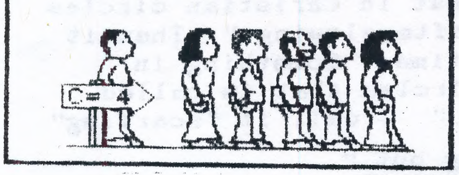
As for the interview article, I was asked to split that piece in two since it was 12 pages in IBM type which makes about 24 pages in The Interface. Plus it will take me some time to re-translate all that text into GEOWrite.

Speaking of which, I have been toying with the idea that, if possible, those sending articles for the newsletter can type these submissions into GEOWrite (or a WinVICE emulator using GEOWrite), convert those articles into a .d81 image, and send those files to me over the Internet where I can take them out of .d81 and feed the article directly into my Commodore 128's GEOWrite 128 v2.1. This may save me some time on this end by not having to manually convert the material letter for letter into GEOWrite. Thanks for you cooperation in this matter.

Wow, I have a short article this time around. Sorry I am so brief. Hopefully, by next go around I will have more to input.

See you in the pages of Commodore!

A Report On The C4 C= Expo



- by Dave Witmer of C4

Howdy Fellow Commodore Users!

Our C=4 Expo #2 is now history! I am sleepy eyed as I'm typing this on Sunday evening, which was the final day of the expo. I'm determined to get a small report out to you folks in this newsletter. If you didn't manage to get out to visit us at the Drawbridge Inn, you missed a wonderful time.

As some of you are aware, in April, one of our club members passed away. Clyde Tucker was a Commodore collector probably like several other members in our club. His passing was indeed a shock for many of us. Roger Hoyer and myself went to Clyde's residence to retrieve some of the Commodore items Clyde had collected over the years. When we were presented to "some of the collection" in the garage, that alone took several hours to migrate to Roger's van. Eventually Roger's van could not hold any more items. So my car, just a small Plymouth Neon was drafted as vehicle number two. Many curious items were in the collection. A Commodore (nixie-tube) calculator brought a lot of interest at the expo. It helped a lot with our raffle we had at the expo to help bring in additional funds.

Going forward from that collection, we suddenly realized that the items we could now offer for sale at the expo would no longer be able to be held in one vehicle, let alone two vehicles. A decision was made to get a U-Haul truck to get it all there in one massive trip. Thanks to the volunteers that helped to load and unload the truck. My back definitely was aching, as I am sure was Roger's. It could have been aching even more if that help had not arrived in a timely fashion. Thanks to Jim Oaks, who helped Roger and I load the U-Haul on Friday. Thanks to Mark Gladson, Dave Fisher, Chuck Kern, Oliver Viebrooks, and even an expo attendee not a member of our club, Stephan, these folks helped unload the U-Haul on Friday afternoon at the hotel.

Since the hotel did not have our room rented the night before our expo, thez graciously allowed us to start setup at 3pm on Friday afternoon. This turned out to be a wonderful turn of events, as we needed that extra time to get everything into the room before the other expo dealers and demo folks started to arrive that night. Nearly halfway through our setup, the dealers starting showing up and bringing in their stuff into the expo room. That room was one hubbub of activity and the social gathering before the "official expo time." As the social activitz continued past midnight, we were supposed to be out of the expo room by 11pm. Nobody came around to enforce it, so it stayed open for a couple of hours beyond that time. At that point I had to remind the few attendees that were there that we were beyond the allotted time we were supposed to be there, and wrap everything up, for in less than 7 hours the doors would open for the expo to the dealers and demo folks. The anticipation for an exciting Saturday at the Drawbridge Inn.

Saturday was the focal point of activity. All the demos were presented during the afternoon, which allowed the vendors to sell their wares all morning. Our lunchtime was a do it whenever zou wanted to leave, but many attendees decided to patronize a catered venue just up the stairs for the other major event in the hotel, the Boxer Dog Show. I briefly chatted with the server of the food that was being catered for the other event. He mentioned our group seemed to be patronized better than the dog show!

When the afternoon demos were over, the raffle prizes were drawn. Anticipation was high as the numbers were called off. Eventually the ultimate, coveted item was picked, and our Mark Gladson won the Commodore calculator. Congrats, Mark!

We returned to the Golden Corral, restaurant of choice from last year's expo, to have our evening dinner. Approximately a couple dozen followed us there. I surprised to find out the manager remembered us from last year and tried his best to get us seated in an area where we all could be together. It was accomplished and many of us enjoyed the meal that was offered there. Many chowed down their food and quickly returned back to the hotel to continue with other activities.

I decided to take a few minutes nap after dinner, since I didn't sleep long the night (or should I say that morning) before. I wound up sleeping until 9pm, sleeping through mz three alarms I had set so I wouldn't oversleep more that 1/2 hour.

When I got back to the expo room, folks were broken up into many little groups doing their own thing. Some were coding away of programs, others playing games on the machines that were scattered through the room, some were shopping, and that continued all the way into 3am Sunday morning. Everyone started flowing out, and at 3:45 I locked the doors to the expo room in preparation for later that day when we could continue after some of us got some sleep.

At 9am I opened the doors again to the expo attendees. Sunday morning, K. Dale Sidebottom indicated he now had several tables of sale items which were now free items for the taking. A shark feeding frenzy, as I call it, instantly encircled LUCKI's tables. The attendees consumed the majority of items Dale had brought to the show in just a matter of minutes! No one wanted to do any demos Sunday afternoon, so a number of dealers decided to finish up their sales and start packing. The room was nearly empty at 3pm.

Thanks to Mark, Dave, Chuck, Oliver, Roger and myself, we managed to get the U-Haul packed up again. At 4pm we decided to go over to Montgomery Inn, just a few doors away from the Drawbridge Inn, to have our final community dinner. There we reflected on the weekend and summarized how much we enjoyed it.

I'd like to thank some of the other volunteers who helped out like Charles Needham, and a few other folks that were not members of our club but stepped up and helped along the way when some help was needed. I also want to thank the folks that did demos, and the folks that supplied items for sale. I am sure I missed a few names; I apologize if I missed your name. As I said at the top of this report, I'm sleepy-eyed as I write this.

If you wish to view some of the items acquired from Mr. Tucker's collection, some of it will make it to this month's meeting. One of which I haven't mentioned yet will be sure to bring some curious folks to check it out. A Commodore C-65! That's right, in the collection from Charles Tucker was a prototype C-65. It was tempting to try and sell it, or raffle it off at our expo, but it was decided that some of our membership might like to view this piece of obscure Commodore hardware

It is important that the input and output lines if the protector go to the appropriate places of the boards. The easiest way to identify which is which: disconnect L5 (or cut the trace if a C64C short board) and measure continuity (zero ohms) with an ohmmeter from pin 7 of any of the RAM chips and one of the open connections at L5 (with the power switch on and PS disconnected, of course). The -output- of the protector (the normally open relay contact) goes to that connection. The -input- side of the protector gets +5V directly from the power supply through the added fuse.

As an alternative, the protector can be built in a small box as a stand-alone device. That way, you can use it with any supply or computer, but that has the disadvantage of needing two DIN connectors and an enclosure. If the protector box is wired directly onto the power supply cable, that eliminates the need for the added connectors, but it will work with only that supply unless physically transferred. You can choose in implementation that works best for you. The circuit is the same regardless of how it's installed.

The stand-alone protector requires a 7 pin male DIN plug on one end that fits the power socket on the computer, and a 7 pin female DIN socket on the other to receive the plug from the power supply. Note that although a 7 pin connector is used, only four pins are active. The socket can be an in-line or chassis mount connector, but the plug should be wired to a short length of cable which allows the protector box to be moved out of the way of the user. My prototype model used a cut off 2' length of cable from an old dead supply. I found a chassis mount female DIN socket from a junked piece of electronics gear and installed it in the protector box. A male DIN plug was pigtailed out of the other side of the box.

If the protector is going to be added directly to the supply cable: route the cable through the box by notching the ends of the box to allow a loop of cable to go through it when the cover is reattached. Cut open the outer jacket of the loop of cable in the box. The red wire (+5V) inside the cable needs to be cut and the ends wired to the protector input and output lines. The end from the supply goes to the input of the protector and the one to the computer goes to the output end. The uncut black wire (ground or negative lead) should have a small bit of insulation removed so it can be attached to the protector circuit ground. The other two wires of the supply cable (usually blue and brown) are the 9VAC lines and should not be opened.

How it works:

The circuit for the protector is simple and straightforward. A 4.7 volt zener diode on the 5 volt line continously monitors that DC level. The resistor in series with the zener diode limits the current to the base of the first transistor Q1, and the resistor from base to ground keeps the transistor cut off until the threshold voltage is exceeded. The zeners 4.7 volts plus Q1 transistors 0.6V B to E drop totals slightly over 5 volts, the trip point of the device. If the supply voltage rises above that level, the zener diode conducts, turns on the transistor and pulls it collector lead to ground. That lead is wired to a normally conducting second transistor Q2 which drives the relay. The diode across the relay coil is there which could destroy the transistor.

The relay contacts are used to pass the +5 supply voltage to the computer when the relay is energized in normal operation. The relay is de-energized only during an over-voltage condition. If the supply fails in that manner, the relay drops out and opens the previously closed contacts cutting off the +5VDC supply voltage to the computer. The circuit is designed to keep the 5 volt line open as long as the fault persists. It is self-reseting.

There is one fuse inside the C64 that protects that protects the 9VAC line but neither the C64 or standard Commodore PS "brick" 5VDC lines are fused. One has been added to the protector circuit. That fuse will open if an external overload (short) is accidently

Jim Drew was an early figure in the history of hardware designed to circumvent copy protection. He is currently CEO of Microcode Solutions, an electronics design firm. We asked him some questions via email about his history with C64 copy protection.

General -

Q: Where have you lived, general age, interests, univeristy/degree, and any other info you'd like to share?

A: I was born and raised in Oregon, moved to Arizona 15 years ago. Attended school in Klamath Falls, Oregon. EE/CE/CS.

Q: What about Honolulu, Hawaii in 1984 as with the article in Amiga Update? Was this a spring break trip only, after finishing school?

A: I moved to Hawaii after graduating from high school with the idea of living there. I had a family there, so I tried it out. Hawaii is nice to visit but not nice to live there year round.

Q: How did you get into computers and electronics? What computers or hardware/electronics did you use and learn before you began working with Commodore computers?

A: I got into electronics courtesy of Radio Shack experimenter kits when I was about 8 years old. My dad brought home a beta Commodore PET 2001, so I started with Commodore products in 1976.

Q: Wow. When you say "beta," does this mean that your dad worked for Commodore?

A: Actually, my dad was involved with a lot of interesting "things." He was a museum director/curator and got Commodore to send a sample to be used for inventory for the 1 million+ items ... lol! 8K of RAM and a cassette tape storage device.

Q: What software/hardware did you create (free of commercial) before you focused on copy protection?

A: I wrote numberous games (Asteroids, Space Invaders, etc.) for the PET series, and a sprite-making program for the VIC-20. I got into disk copying when the 1540 was released, which is realy when copy protection started with the Commodore stuff.

Q: I don't know of any copy protection from the 1540 era. Can you give more examples of this earliest protection? Was this for the VIC-20? Or were the first Commodore protections for the 64?

A: The VIC-20 had oodles of cassette tape protection. Commodore stored the data twice (each byte twice) for redundancy. Some of the early tape protection had their own loaders that used allof the data space, which fave them this incredible ability to load twice as fast as normal programs! LOL! I don't remember all of the early disk protections for the 1540, but the CBM8080 disk drives had a common protection used with the PETs to have a paper punched hole in the media in the upper tracks.

CBM Protection Methods -

Q: How did you get started analyzing protection methods?

A: By cracking the software!

Q: Who do you think were the innovators in designing protection schemes?

A: Thre were a lot of people doing it. Kevin Pickell stands out the most.

Q: I wasn't familiar with him. I found this info at MobyGames.com. I was hoping maybe he was linked to Rapidlok, since he did some Accolade titles. However, all the games Kevin was involved in were the ones *not* Rapidlok-protected. Which protections did he invent, and what company did he work for?

A: Kevin Pickell worked on the Test Drive series as a programmer and did the copy protection for it and some of the EA games.

Q: Did you communicate with them at all? Who were the friends you talked with about protection methods, drive hardware, needs and wishes for a "perfect" disk backup tool?

A: Oddly enough, Mike J. Henry (Fast Hack'em fame) lived in Portland, Oregon (where I lived) and vame to my office (Commodore headquarters for educational support) on several occasions, and we used to crack software. There were really only a handful of people that could crack everything, so chatting (with others) with a little limited.

Q: Ah, so you were close competitors in more ways than one. To someone a little unfamiliar with your products, what was the unique selling point regarding the technical features of your protection busters, if we don't count hardware-based copiers?

A: More bells and whistles. Lots of user controls.

Q: What was you involvement wiht Central Point or possibly data rescue companies, like Ontrack?

A: I wrote the 2nd generation of Copy |+ 64/128. The first version had code "borrowed" from Mike J. Henry, and Mike got a settlement, and I got the job of writing the new version.

Q: Interesting. Who wrote the first version of Copy |+? No one I know even saw a pirated copy of Copy |+, version 1. The lowest version I've seen for the C64 is 3.0 Are you talking about the Apple version?

A: Dave (something-or-other) wrote the first version. I can't recall his last name. He was older - in his 40's at the time. v3.0 with the blue screen and white text is the version that I wrote. I think Dave's version is 2.0.

Q: What did you learn from your competitors? Where do you think your competitors were better than you, and how did you catch up to their performance and/or knowledge?

A: Mike was probably the best at writing transfer routines (high speed), although the code that we came up with at Central Point software written by myself and Mike Brown (owner of Central Point Software) was nearly 20% faster. I really didn't understand the serial port too well, and my attempts at fast loaders were not up to par with others. My expertise was with the GCR data read/write and decoding, especially with varying density rates.

Q: How do you think CBM DOS knowledge was obtained by people, lik Richard Immers (Datamost) and other hobbyists?

A: From Commodore directly. All developers could get the information, including an assembly listing of the 1541 drive code. This made it quite easy to understand how the job queue and such worked.

Q: Was this during the Commodore dealer/downtown Portland time? What else were the connections to Commodore via your father?

A: I chatted with Commodore directly while I was in Portland. I was the education support rep for the State of Oregon for Commodore.

Q: Besides in-home development, how did authors of protection methods sell their approach to multiple vendors? For instance, RapidLok was used by Accolade, Mindscape, Advantage, Avalon Hill, and others.

A: No clue. I didn't deal with any of that.

Q: In your mind, what is the timeline of major advances in Commodore (and other) floppy-based protections? For example, Access's move from simple error-checking (Beach Head, 1983) to non-CBM track patterns (Raid Over Moscow, 1984) in my idea of one such advantage.

A: I don't recall the timeline, but when everyone moved from standard error-checking that caused the head to rattle, to job queue events (which don't), that marked an era of complexity for determining the protection scheme. It was natural progression to see the same types of disk protection being used on the Apple |++ software being used on the C64 software. The Apple |++ was quite aways ahead of the C64 in terms of disk protection and duplication.

Q: Does this mean that protection schemes as well as copier methods could be derived from the Apple |++ and ported over the the C64/1541? Does this mean that such coding techniques were actually used on at least some methods (protection and/or busting them)? I'm interested in hearing more about the relationship between the two. The facts I know are: Encoding was GCR; there was no problem with a shift register and '000' bits; the sync circuit was not hardware, it was software (Ed. The Apple hardware actually syncs to every '1' bit, so all data is stored with the MSB set. It uses 0011111111 as the sync signal); The stepper motor could move to 1/4 tracks. Interesting side note: 6502 designer, Chuck Peddle, said in an interview (quoted in the book "On The Edge") that he had patened GCR. I wonder if Apple licensed that from Commodore?

A: The Apple disk protection and the C64 disk protection were nearly indentical to many cases. Only with the advent of things, like RapidLok, did protection really take a turn with the C64 stuff. Apple's GCR was 3/4 and the CBM GCR was 4/5. You could get more data with the CBM GCR encoding than Apple's, but the penalty was that you could not do realtime decoding like you could with the Apple GCR. The 6502 was invented my MOS technologies, which Commodore bought. I doubt there was a problem. (Ed: I guess Jim's point is that Apple's GCR was different enough from Commoore's to not require a license.)

Q: What kind of equipment did you develop for analyzing protection? What did you keep private versus selling to users?

A: I had a 8K RAM that was mapped to the zero page and with a flip of the switch, it was remapped to high memory. This allowed me to simply load a program, flip the switch, reset the computer and drive, and then go look at the drive's ram contents. Disassembling this code made it easy to determine how the protection scheme worked. I kept this to myself, although I am sure others had the same thing.

Q: Nice idea. Did this ever make it into a product of yours, even if it had to be jumpered of something?

A: Nope. This was mine.

Q: What was your typical work environment for testing and using your own products? Which computers did you use for this, peripherals, cartridges, OS extensions, floppy speeders, freezers, etc.? Did you analyze data directly from the 1541 head (i.e. with an oscilloscope or other analog tools)?

A: I used a C64 initially, and then I managed to get Dave Haynie's personal C128 (which I still have with the sticker "Property of Commodore Business Machines" on the bottom of it.) I used a few cartridges, but for the most part all of my work with the disk drive ... which had the extra RAM, digital track display w/density indicator, drive select switch, reset, etc. I used an oscilloscope once. My partern, Steve Berns, and I made a dual-drive duplication system that was never released. Now I wish would have released it. At the time, I didn't know enough about how tracks were laid out and such, and I kick myself now for not making it after I learned! The device was a write circuit. The read head signal was sent via a two wire cable to a write circuit in the other drive. Whatever the first drive read, the second drive wrote. The data had to be inverted, and I had to look at this data with a scope. It was really cool. Just by loading a program, it would write that program to the other disk. The problem was the when the head was stepped or the write was turned off at some arbitrary time, the data written was corrupted. If I had made a simple program to wait for the track gap before turning off the write, we could have duplicated EVERYTHING several years before the Epyx long track stuff was ever released. The reason behind not releasing this device was that it required two disk drives, and NOBODY could afford two disk drives, so the market was really small ... of course several years later, things changed and we already +had| SuperCard+ and needed to support it. Besides, this device was SIMPLE ... 3 transistors and a few resistors ... it would have been more common that the 21-Second Backup cable! LOL!

Q: Very nice!

A: Incidentally, Dave Haynie +and I| are actually in the same market, sort of competing against each other. We chatted a few times recently. He works for Nomadio, a company that develops R/C radio systems. I also own a company that develops R/C radio systems (Xtreme Power Systems).

Q: Can you explain more how this was possible? How did you handle synchronization, for example? What about RPM differences and jitter? Also, how could you reliably detect the tail gap? For instance, I thought weak bits might fool pattern-based tail gap detection.

A: We never released the product. It didn't work as it was because if needed some type of method for determining the track gap. This was LONG before I even knew what a track gap was! LOL! RPM differences really would not matter. Considering that manufacturers had to load their software on drives that are clearly out of alignment for day one, they could not resort to things like RPM variations for protection. I think too much concern is placed on weak bits. There are ways to truly find the write splice(s) reliably and locate the track gap. The way that I ended up doing it was by reading the track at varying densities and doing a compare on the shifting pattern.

Q: I have some related questions about your other partners. Maybe you could give some quick thoughts on the following people: Reggie Warren (1987 news message in comp.sys.amiga)

A: Reggie Warren was the sole owner of Megasoft. Kind of a snake really. Took a lot of money on promises of product not even beta tested yet.

Q: Jack Cornelius (1992 news message by you in comp.sys.amiga.emulations and 2001 news post from Stingray in comp.sys.cbm)

A: Ah ... Jack. This is the Shadow creator.

Q: Jack Radigan, designer of The Shadow (1997 news message by you in comp.sys.amiga.emulations)

A: No clue who Jack Radigan was, but he was not associated with The Shadow.

Q: Can you tell me more about them? Were any of these people related to other hardware/electronics manufacturing companies?

A: I know nothing about Jack and met him only once. REgie contracted me for many products, including fixing the Shadow.